Irrigated Lands Program – Technical Issues Committee

Application of Water Quality Standards

How Regional Board Staff Identify Numerical Water Quality Limits

Jon B. Marshack, D. Env.
Staff Environmental Scientist
(916) 464-4723
jmarshack@waterboards.ca.gov

Slide 1

How do staff identify numerical limits for Board consideration?

- Water Quality Standards
- Promulgated Water Quality Criteria
- Implementation Plans
- Principles for Limit Selection

Slide 2

Water Quality Standards

Federal Clean Water Act—

- Provisions of state or federal law
- **Designated use** or uses for waters of the United States
  and
- **Water quality criteria** for such waters based upon such uses

Slide 3

Application of Water Quality Standards

Water Quality Standards In California

Water Quality Standards include

- **Beneficial Uses**
  for each water body or portion thereof
- **Water Quality Objectives**
  (criteria) to protect uses
- **Antidegradation Policies**
  to maintain high quality waters

Porter-Cologne Act also requires

- **Implementation Programs**
  to achieve compliance with the objectives

Slide 4

Present and Potential Beneficial Uses of Waters of the State

- Municipal and Domestic Supply
- Agricultural Supply
- Industrial Supply
  - **Service Supply**
  - **Process Supply**
- Groundwater Recharge
- Freshwater Replenishment
- Navigation

Slide 5

Present and Potential Beneficial Uses of Waters of the State

- Hydropower Generation
- Recreation (both Water Contact & Non-Water Contact)
- Commercial & Sport Fishing
- Aquaculture
- Freshwater Habitat (both Warm & Cold)
- Estuarine Habitat

Slide 6

Application of Water Quality Standards

Present and Potential Beneficial Uses of Waters of the State

- Wildlife Habitat
- Preservation of Biological Habitats of Special Significance
- Preservation of Rare, Threatened, or Endangered Species
- Migration of Aquatic Organisms
- Spawning, Reproduction, and/or Early Development
- Shellfish Harvesting

Slide 7

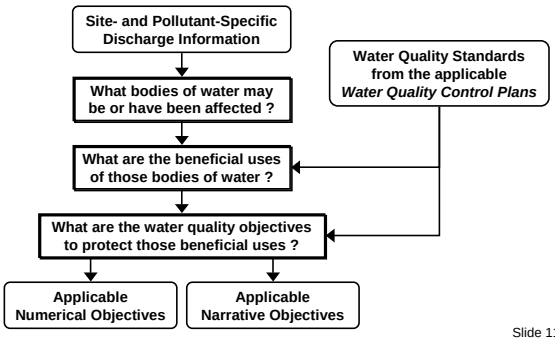
Water Quality Objectives

Come in two forms

- Numerical
  - Specify a concentration limit
- Narrative
  - Describe a requirement or prohibit harmful conditions

Slide 8

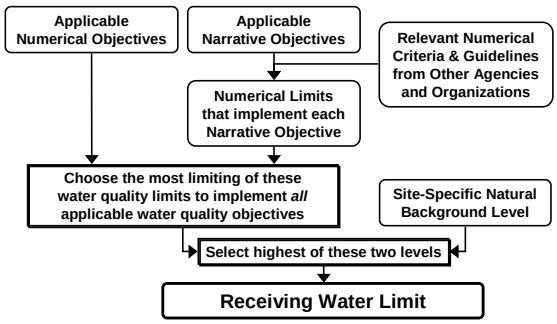
Selecting Receiving Water Limits



Slide 11

Application of Water Quality Standards

Selecting Receiving Water Limits



Slide 15

Numerical Water Quality Objectives Include

- Arsenic
- Bacteria
- Barium
- Boron
- Cadmium
- Copper
- Cyanide
- Diazinon
- Dissolved Oxygen
- Iron
- Manganese
- Methyl-mercury
- Molybdenum
- pH
- Salinity
  - TDS & EC
- Selenium
- Silver
- Temperature
- Thiobencarb
- Turbidity
- Zinc

Slide 16

Narrative Water Quality Objectives Include

- Chemical Constituents
- Toxicity
- Tastes & Odors
- Pesticides

Slide 17

Chemical Constituents Objective

- Waters shall **not** contain chemicals in concentrations that **adversely affect beneficial uses**
- List of numerical objectives
- Waters designated MUN shall not exceed California **drinking water standards**, Maximum Contaminant Levels (MCLs)
  - **To protect all beneficial uses, the Regional Board may apply limits more stringent than MCLs**

Slide 18

Numerical Limits Used to Apply Chemical Constituents Objective

- California Drinking Water MCLs — DHS
- Federal Drinking Water MCLs — USEPA
- *Water Quality for Agriculture* by Ayers and Westcot — FAO-UN

Slide 19

Toxicity Objective

- All waters shall be **free of toxic substances in concentrations that produce detrimental physiological responses** in human, plant, animal, or aquatic life
  - Toxicity caused by a single substance or the interaction of multiple substances

Slide 20

Application of Water Quality Standards

Numerical Limits Used to Apply Toxicity Objective

- California Public Health Goals — OEHHA
- Federal MCL Goals — USEPA
- California State Action Levels — DHS
- Integrated Risk Information System — USEPA
- Cancer Risk Estimates — OEHHA, NAS
- Health Advisories — USEPA & NAS
- National Recommended Ambient Water Quality Criteria — USEPA
- Pesticide Hazard Assessments — CDFG

Slide 21

Tastes & Odors Objective

- Water shall not contain taste- or odor-producing substances in concentrations
  - That impart undesirable tastes or odors to water supplies or to fish flesh or
  - That cause nuisance or
  - Otherwise adversely affect beneficial uses

Slide 22

Numerical Limits Used to Apply Tastes & Odors Objective

- Secondary MCLs — DHS & USEPA
- National Recommended Ambient Water Quality Criteria — USEPA
- Drinking Water Health Advisories — USEPA & NAS
- Taste and odor thresholds — USEPA & others

Slide 23

Application of Water Quality Standards

Taste & Odor vs. Toxicity

	California Primary MCL	Taste & Odor Threshold
Ethylbenzene	300 ug/L	29 ug/L
Toluene	150 ug/L	42 ug/L
Xylenes	1750 ug/L	17 ug/L
MTBE	13 ug/L	5 ug/L

Slide 24

Pesticides Objective

- No pesticides in water, sediment or aquatic life in concentrations that adversely affect beneficial uses
- Total persistent chlorinated hydrocarbon pesticides in detectable concentrations
- Not to exceed lowest levels technically and economically achievable
- Not exceed MCLs in MUN waters

Slide 25

Numerical Limits Used to Apply Pesticides Objective

- Water & sediment toxicity limits
  - including bioaccumulation (see above)
- Taste and odor limits (see above)
- Method Detection Limits for persistent chlorinated pesticides USEPA
- California Drinking Water MCLs DHS

Slide 26

Application of Water Quality Standards

Other Narrative Water Quality Objectives

- Biostimulatory Substances
- Color
- Floating Material
- Oil and Grease
- Radioactivity
- Sediment
- Settleable Material
- Suspended Material
- Temperature
- Turbidity

Slide 27

CALIFORNIA ENVIORNMENTAL PROTECTION AGENCY
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

A Compilation of
WATER QUALITY GOALS

August 2003

A Source for Numerical Water Quality Limits

Available on the Internet at

www.waterboards.ca.gov/centralvalley/available_documents/ under **"**Water Quality Standards & Limits**"**

Slide 28

Policy for Application of Water Quality Objectives

- Where objectives apply
  - In all waters where beneficial uses have been designated, **not just at points of use**
  - To protect future and existing uses

Slide 29

Policy for Application of Water Quality Objectives

- Numerical receiving water limitations will be established in Board orders which, at a minimum, **meet all applicable water quality objectives**
- Board will impose more stringent limits to maintain existing water quality unless some degradation is allowed pursuant to State Board Resolution No. 68-16 (Antidegradation Policy)

Slide 30

Policy for Application of Water Quality Objectives

- Narrative objectives
  - Implement with numerical limits in orders
  - Evaluate compliance by considering
    - Direct evidence of beneficial use impacts
    - Information submitted by the discharger and other interested parties
    - Relevant numerical criteria and guidelines from other agencies and organizations

Slide 31

Policy for Application of Water Quality Objectives

- Minimum & Maximum Levels
  - **Water Quality Objectives** least stringent limits imposed on ambient water quality
  - **Background** most stringent limits imposed on ambient water quality
    - **Antidegradation Policy**
    - **Controllable Factors Policy**

Slide 32

Policy for Application of Water Quality Objectives

- Water quality objectives do not require improvement over natural background concentrations
  - If Background > Water Quality Objective discharges of waste are not allowed to cause further degradation
- Interaction of multiple toxic pollutants
  - Assume additivity for carcinogens and substances with similar toxic effects

Slide 33

Additional Pesticide Limits from the Basin Plans

- Discharge Prohibition for Pesticides
  - Prohibits pesticide containing discharges that fail to meet management practices that achieve numerical Performance Goals
- Pesticide Discharges from Nonpoint Sources
  - For pesticides that lack numerical water quality objectives, recommended criteria, or guidance
  - Board will consider 1/10 of the LC50 for most sensitive aquatic life species as the upper limit

Slide 34

California Toxics Rule (CTR)

- Federal Clean Water Act
  - All States are required to have enforceable numerical water quality criteria for “priority toxic pollutants” in surface waters
  - California’s Water Quality Control Plans lack limits for many priority pollutants

Slide 35

Application of Water Quality Standards

California Toxics Rule (CTR)

- National Toxics Rule (NTR), USEPA
  - 1992 (amended in 1995 & 1999)
- Statewide WQ Control Plans rescinded
  - 1994
  - Court order from discharger lawsuit
- California Toxics Rule, USEPA
  - 2000 (amended 2001)
  - NTR criteria retained

Slide 36

California Toxics Rule (CTR)

CTR and NTR Criteria
+ Basin Plan beneficial use designations
= enforceable Water Quality Standards

Slide 37

California Toxics Rule (CTR)

- Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries (SIP)
  - State Water Board adopted in 2000
    - **Time schedules**
    - **Mixing zones**
    - **Effluent limits**
    - **Analytical methods & reporting levels**
  - Amended in February 2005

Slide 38

Guiding Principles for Identifying Limits

- Use purely risk-based limits instead of risk management-based limits
  - Risk management-based limits may contain information and constraints that are not relevant to protecting water resources
- Use California limits when available
  - Consistency with other California agencies

Slide 39

Guiding Principles for Identifying Limits

- Use limits that reflect peer-reviewed science
  - Avoid using draft or provisional limits if possible
- Use limits that reflect current science
  - Newer limits rather than older limits
- Use relevant limits
  - Compare intent with language of narrative objective
  - Check exposure routes

Slide 40